Joint hypermobility, dynamic balance and postural control in dancers: Implications for clinical practice

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Keywords: Biodex Stability System; Beighton Score; Ehlers Danlos Syndrome Hypermobility Type

Purpose: Joint hypermobility (JH) is the ability of a joint to move passively or actively beyond normal range of motion and is assessed by the Beighton score (BS) involving five joint measurements providing a maximum score of 9. JH is associated with chronic pain, joint instability, reduced proprioception and soft tissue injury, referred to as Generalized Hypermobility Spectrum Disorder and demonstrates characteristics of Ehlers-Danlos Syndrome Hypermobility Type (EDSHT). Dancers demonstrate a high prevalence of JH. This study considered the effect of JH on dynamic balance and postural control and the implications for injury.

Methods: Twenty-four university level dancers (21 females, 3 males, 20.71 ± 0.93 years, height 152 ± 7.75 cm, mass 45.80 ± 12.23 kg) volunteered to participate. Sample size was informed by a previous reliability study which recommended a minimum of 20 participants (Bates et al., 2016). Participants practiced dance (≥10 h/week) for at least 3 years and were injury free for 6 months prior to the study. JH was measured using the BS and classified as 0–3 (not hypermobile, n = 8), 4 to 6 (hypermobile, n = 8) and 7 to 9 (distinctly hypermobile, n = 8) (Stewart and Burden, 2004). Total BS inter-rater reliability was determined using an Intraclass Correlation Coefficient3,1 (0.99, 95% Confidence Intervals: 0.98–0.99), indicating excellent reliability. The Biodex Stability System (BSS) (Shirley, New York, USA) is a valid and reliable measure of dynamic balance and postural control providing an Overall Stability Index (OSI) and consists of a circular platform that moves in anterior, posterior, medial and lateral directions. Participants completed the Athlete Single Leg Stability Testing programme at Level 4 barefoot with their eyes open. Following a familiarisation trial participants completed 3 trials of 20 s on one leg with a 30 s rest period using randomised ordering of leg dominance and aimed to maintain a target centrally on a screen. Data collection was performed by a Chartered Physiotherapist trained in the BS and BSS. A Shapiro–Wilk test was used to determine normality of OSI data and a Levene's test assessed homogeneity of variance. A one-way ANOVA determined the difference between OSI for the 3 JH groups using IBM SPSS version 24 ($P < 0.05$).

Results: OSI was normally distributed for the 3 groups ($P > 0.05$) and there was homogeneity of variance for both limbs ($P > 0.05$). There was no significant difference between groups (dominant limb, $P = 0.81$, non-dominant limb, $P = 0.54$). The mean OSI for both legs was: not hypermobile (1.2 arbitrary unit (au)), hypermobile (1.3 au), distinctly hypermobile (1.07 au). Mean ± SD BS was 4.63 ± 2.06.

Conclusion(s): Within the general population JH is thought to be linked to reduced dynamic balance, postural control and increased injury risk but within dancers training attributes may attenuate any potential reductions in dynamic balance and postural control. Future research could consider of the characteristics of EDSHT.

Impact: The lack of effects of JH on dynamic balance and postural control might relate to the balance training associated with dance and could be used to potentially limit reductions in the general JH population to reduce injury risk.